

THE CLAIMS

What is claimed is:

1. A golf ball comprising:
 - 5 a core having a first outer surface;
 - a cover; and
 - an intermediate layer disposed between the core and the cover, the intermediate layer comprising a non-ionic hydrophobic stiff fluoropolymer having a surface energy of less than about 75 dyne/cm² and having a second outer surface;
 - 10 wherein at least one of the first or second outer surfaces are treated with an functional silane such that a sufficient number of surface amine, hydroxyl, carboxylic acid, or epoxy groups are available for binding to an adjacent layer.
2. The golf ball of claim 1, wherein the functional silane is an aminosilane that forms surface
15 amine groups for binding.
3. The golf ball of claim 1, wherein the non-ionic hydrophobic stiff fluoropolymer has a surface energy of less than about 50 dyne/cm².
- 20 4. The golf ball of claim 1, wherein the non-ionic hydrophobic stiff fluoropolymer has a surface energy of less than about 40 dyne/cm².
5. The golf ball of claim 1, wherein the non-ionic hydrophobic stiff fluoropolymer is a
25 homopolymer, copolymer, or terpolymer formed from a polymerization of one or more non-ionic fluoromonomers.
6. The golf ball of claim 1, wherein the intermediate layer further comprises a thermoplastic material comprising polyesterester block copolymers, polyetherester block copolymers, polyetheramide block copolymers, partially or fully neutralized ionomer resins, dynamically
30 vulcanized thermoplastic elastomers, hydrogenated styrene-butadiene elastomers with functional groups attached, thermoplastic polyurethanes, thermoplastic polyesters,

metallocene polymers; styrene-propylene-diene rubbers; polybutadienes; chloroprene rubbers; acrylonitrile rubbers; acrylonitrile-butadiene rubbers; ethylene/propylene/diene terpolymers; polypropylene resins; epoxy; polyurea; styrene-ethylene block copolymers; maleic anhydride or succinate modified metallocene catalyzed ethylene copolymers;
5 chlorinated polyethylenes; polysulfide rubbers; fluorocarbons; or polymethylmethacrylate.

7. The golf ball of claim 1, wherein the adjacent layer is the core or the cover.

10 8. The golf ball of claim 1, wherein the non-ionomeric fluoropolymer has a material hardness between about 25 and about 75 Shore D.

9. The golf ball of claim 7, wherein the non-ionomeric fluoropolymer of the intermediate layer has a material hardness of between about 50 and about 70 Shore D.

15 10. The golf ball of claim 1, wherein the intermediate or cover layer has a thickness between about 0.005 inches and about 0.085 inches.

11. The golf ball of claim 9, wherein the intermediate or cover layer has a thickness between about 0.030 inches and about 0.060 inches.

20 12. The golf ball of claim 1, wherein the golf ball has an outer diameter between about 1.500 inches and about 1.650 inches.

25 13. The golf ball of claim 1, wherein the golf ball has an outer diameter between about 1.550 inches and about 1.640 inches.

14. The golf ball of claim 1, wherein the intermediate layer has a specific gravity of about 1.1 to about 1.8 in the absence of a density-adjusting filler.

30 15. The golf ball of claim 14, wherein the specific gravity is from about 1.3 to about 1.6.

16. The golf ball of claim 1, wherein the core comprises a center and at least one outer core layer.

17. The golf ball of claim 14, wherein the center is solid, hollow, liquid-filled, gel-filled, or gas-filled.

18. The golf ball of claim 14, wherein the aminosilane comprises γ -aminopropyltriethoxysilane; γ -aminopropyltriethoxysilane; γ -aminopropyltriethoxysilane; aminoalkyl silicone solution; modified aminoorganosilane; γ -aminopropyltrimethoxysilane; n- β -(aminoethyl)- γ -aminopropyltrimethoxysilane; modified aminoorganosilane (40% in methanol); modified aminosilane (50% in methanol); triaminofunctional silane; bis-(γ -trimethoxysilylpropyl)amine; n-phenyl- γ -aminopropyltrimethoxysilane; organomodified polydimethylsiloxane; polyazamide silane (50% in methanol); or n- β -(aminoethyl)- γ -aminopropylmethyldimethoxysilane.

19. The golf ball of claim 17, wherein the aminosilane is n- β -(aminoethyl)- γ -aminopropyltrimethoxysilane.

20. The golf ball of claim 1, wherein the cover comprises a castable or non-castable thermoplastic or thermosetting material comprising partially- or fully-neutralized ionomer resins; epoxy; polyurethanes comprising polyols and polyisocyanates; balata; vinyl resins; polyolefins; polyureas; polyamides; acrylic resins and blends thereof; block copolymers; copoly(ether-amide); polyphenylene oxide resins and blends thereof; thermoplastic polyesters; blends and alloys including polycarbonate with acrylonitrile butadiene styrene and polyvinyl chloride with acrylonitrile butadiene styrene; blends of thermoplastic rubbers with polyethylene and propylene; or a mixture thereof.

21. The golf ball of claim 1, wherein the core has a Shore D hardness of less than about 60.

22. The golf ball of claim 1, wherein the cover comprises at least one additive comprising antioxidants; catalysts; colorants including pigments and dyes; hindered amine light

stabilizers; optical brighteners; UV absorbers; fillers; metals; plasticizers; surfactants; viscosity modifiers; compatibility agents; dispersing agents; foaming agents; reinforcement agents; release agents; or a mixture thereof.

23. The golf ball of claim 1, where the non-ionic hydrophobic stiff fluoropolymer has a water absorption at 20°C immersion for 24 hr of no greater than about 0.07%.

24. A golf ball comprising:

a core having a first outer surface;

a cover; and

an intermediate layer disposed between the core and the cover, the intermediate layer comprising a non-ionic hydrophobic stiff fluoropolymer having a surface energy of less than about 55 dyne/cm², a water absorption at 20°C immersion for 24 hr of less than about 0.1%, and having a second outer surface;

wherein at least one of the first or second outer surfaces are treated with an aminosilane such that a sufficient number of surface amine groups are present and result in the treated layer having a peel strength of at least about 5 lb/in.

22. The golf ball of claim 23, wherein the peel strength is at least about 10 lb/in.

23. The golf ball of claim 22, wherein the peel strength is at least about 15 lb/in.

24. The golf ball of claim 23, wherein the aminosilane comprises γ -aminopropyltriethoxysilane; γ -aminopropyltriethoxysilane; aminoalkyl silicone solution; modified aminoorganosilane; γ -aminopropyltrimethoxysilane; n- β -(aminoethyl)- γ -aminopropyltrimethoxysilane; modified aminoorganosilane (40% in methanol); modified aminosilane (50% in methanol); triaminofunctional silane; bis-(γ -trimethoxysilylpropyl)amine; n-phenyl- γ -aminopropyltrimethoxysilane; organomodified polydimethylsiloxane; polyazamide silane (50% in methanol); or n- β -(aminoethyl)- γ -aminopropylmethyldimethoxysilane.

25. A golf ball comprising:

a core having a first outer surface;

a cover; and

an intermediate layer disposed between the core and the cover, the intermediate layer

5 comprising a non-ionic hydrophobic stiff fluoropolymer having a surface energy of no greater than about 55 dyne/cm², a coefficient of friction of less than about 0.55, and having a second outer surface;

10 wherein at least one of the first or second outer surfaces are treated with n-β-(aminoethyl)-γ-aminopropyltrimethoxysilane in an amount sufficient to result in a peel strength between treated layers of at least about 10 lb/in.

26. The golf ball of claim 25, wherein the coefficient of friction of less than about 0.45.